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ROBERT J. CARLIN

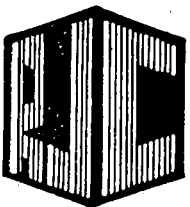
and Associates

RECEIVED

FEB 28 1984

By _____

T & M ASSOCIATES INC.



SOILS & FOUNDATION ENGINEERS

99 Clove Road
Little Falls, New Jersey 07424

ROBERT J. CARLIN & ASSOCIATES
CONSULTING ENGINEERS
SOILS AND FOUNDATIONS
99 CLOVE ROAD
LITTLE FALLS, N. J. 07424
TEL. (201) 744-2020

15 February 1984

T & M Associates
P.O. Box 828
Red Bank, NJ 07701

Attn: Mr. Richard Kosenski, P.E.

Re: Report on Subsurface Soil Investigation
New Market Pond, Piscataway, NJ (84-16)

Gentlemen:

In accordance with your letter of authorization, dated 1 February 1984, we have completed our investigation for the referenced project. Our scope of work included test borings at locations selected by your office, preparation of boring logs, a boring location plan, and this report containing our analysis with recommendations for construction.

Within the project site, there are 5 areas to be investigated. These areas are:

1. Within the existing pond; upstream and downstream of the Washington Avenue Bridge.
2. The Impoundment Basin, between the railroad tracks and Lakeview Ave, east of the pond.
3. The Sediment Pond located east of the existing park, along Bound Brook stream.
4. The Boat Docks; one located on the south bank of the pond near the dam, the other located at the east end of the pond.
5. The Parking Lot to be constructed south of the pond near the dam.

A total of 8 test borings were performed for the project site. Soils samples from each boring were obtained for examination and testing. Grain Size Analysis were made on selected samples and are included in this report.

SOIL CONDITIONS

The subsurface soil conditions encountered in the borings may be summarized as follows, for each of the areas investigated:

POND (- Boring B-5 and B-7)

1. The depth of ice and water combined, was about 1 to $1\frac{1}{2}$ feet deep.
2. The surface soil was black or gray Organic Silt, encountered to a depth of between $2\frac{1}{2}$ and $5\frac{1}{2}$ feet below the ice surface.
3. Below the organic silt in boring B-7 was medium stiff light gray Silt & Clay with layers of fine Sand and Silt. This stratum was about 3 feet thick. In Boring B-5 medium dense red brown Silt, some fine Sand was encountered below the organic silt layer. This stratum was also about 3 feet thick.
4. The silt, and silt & clay layers, were underlain by compact red brown coarse to fine Sand, little Silt, some coarse to fine Gravel. This layer was encountered to depths of between 7 and 11 feet, where refusal on the underlying Shale bedrock was obtained. Both of these borings ended at these depths, penetrating several inches into the Shale.

IMPOUNDMENT AREA (Borings B-3 and B-4)

1. The surface layer is medium compact brown coarse to fine SAND, and Silt to a depth of between 2 and 4 feet below the surface. This layer in boring B-4 is probably recent soil Fill.
2. Below the surface sand and silt, compact red brown coarse to fine SAND, little Silt, little medium to fine Gravel was encountered, to depths of 5 to 6 feet where the borings ended. In boring B-4 refusal was obtained at a depth of 5 feet, probably on the Shale bedrock surface.

Groundwater was encountered at a depth of 4 feet below the surface in boring B-3.

SEDIMENT POND (Boring B-2)

1. The surface layer is soft brown Organic SILT, about 4 feet thick.
2. Below the organic silt is loose brown medium to fine SAND, little Silt, encountered to 9 feet below the surface.
3. The fine sand is underlain by compact red brown coarse to fine Sand, some Silt, some coarse to fine Gravel, which was encountered to the bottom of the boring. Refusal was obtained on the Shale bedrock, $10\frac{1}{2}$ feet below the surface.

Groundwater was observed just below the ground surface, at a depth of 6 inches.

BOAT DOCKS

Boring B-6 -- east end of pond

1. The surface layer is black coarse to fine Sand, some Silt about 6 inches thick.
2. Below the black sand is medium compact to compact red brown coarse to fine SAND, little Silt, some coarse to fine Gravel, which was encountered to refusal, $10\frac{1}{2}$ feet below the surface. Refusal was obtained on the Shale bedrock, where the boring penetrated several inches into the surface.

Groundwater was observed at a depth of 3 feet below the surface.

Boring B-8 -- west end of pond

1. From the surface to a depth of 8 feet, where refusal was obtained, are layers of soft red brown coarse to fine Sand, and Silt, little medium to fine Gravel. The soil layers become compact below a depth of about 6 feet. The Shale bedrock was encountered at a depth of 8 feet, where the boring penetrated several inches in the rock surface.

Groundwater was observed just below the surface, at a depth of about 1 foot.

PARKING LOT (Boring B-1)

1. From the surface to a depth of 6 feet is FILL consisting of medium compact red brown coarse to fine SAND, little Silt, some coarse to fine Gravel. The boring ended in the fill layer, 6 feet below the surface.

EVALUATION & RECOMMENDATIONS

POND

We understand that the existing pond is to be excavated to increase the depth of water to about 5 feet. This will require removing about 3 to 4 feet of soil throughout the pond area. Based on the boring data, the shale bedrock is below these planned depths.

To maintain stable slopes around the pond, the following guidelines are recommended.

1. Slopes above maximum high water level should be a minimum of 1 vertical to 2 horizontal.
2. Slopes below the maximum high water level should be a minimum of 1 vertical to 3 horizontal.

The section of bank subject to variations in water level or wave action should be protected with rip rap or other erosion control methods.

In the vicinity of the existing bridge piers or abutments, no excavations are planned.

IMPOUNDMENT BASIN

The basin will be constructed by forming a berm about 12 feet high, using the on-site soils. The two borings completed in this area show the surface soil layers, to a depth averaging about 3 feet, are brown coarse to fine Sand, and Silt (Stratum #1). This soil type is well suited for use in constructing the berms for the planned basin. The red brown coarse to fine SAND, little Silt, little medium to fine Gravel (Stratum #2), is not suitable for use in forming the berms, due to the high percentage of coarse sand and gravel. As you have indicated, the average planned depth of excavation for the basin will be about 3 feet below existing grades.

To prepare the subgrade for construction of the berms, the area must be stripped of all topsoil and vegetation. The

width of the berm at the base must incorporate a minimum slope of 1 vertical to 2 horizontal downstream, and 1 vertical to 3 horizontal upstream. The berm should be a minimum of 10 feet wide at the top.

After the subgrade has been stripped, approximately 10 feet of fill will be required to achieve the top of berm elevation. Incorporating the above-mentioned upstream and downstream slopes, the berm base will be approximately 60 feet wide. These recommendations are in accordance with general guidelines for design of small dams.

The berm must be constructed of soil with a permeability of 10^{-5} to 10^{-6} cm/sec. Such soil would be very fine sand, silt, clay or sand and clay mixtures. These materials can be found on-site. This impervious section must extend from the stripped subgrade elevation to a minimum of 1 foot above maximum anticipated water elevation. The fill for the berm section must be installed in 1 foot lifts, and each lift compacted to 92% Maximum Modified Density prior to installation of subsequent lifts. The existing soil beneath the berm can safely support the weight of the new fill.

The anticipated seepage through and below the berm base for the above-mentioned construction procedures and site conditions, will not present a stability problem to the embankment.

Seepage collars will be necessary on any pipes installed through the berm. These collars should be sized and spaced to increase the seepage path by 15%. A minimum of 2 collars must be provided on each pipe.

An emergency overflow spillway must also be provided to assure that the water in the pond never flows uncontrolled over the berm. The spillway must be lined with stone or blankets designed to control erosion.

Groundwater was recorded about 4 feet below the surface in boring B-3. For the planned depth of excavation some groundwater may be encountered. Open channels and minor pumping should be adequate to control this flow of water.

The shale bedrock was encountered about 4 feet below the surface in this area, and should be below the planned excavations.

SEDIMENT POND

The planned Sediment Pond will be approximately 150 by 400 feet in plan dimension. The layers of soft organic silt, and loose sand are not capable of supporting any new loads, such as heavy construction equipment.

The shale bedrock was encountered at about 10 feet below the ground surface.

Minimum embankment slopes, above and below the water level must be maintained to prevent slope failures. The slope guidelines included for the Pond, also apply to this area.

BOAT DOCK

Two dock locations are planned for the project. One along the south bank at the west end of the pond, near the dam. The other location is on the east end of the pond near the railroad tracks.

We understand the boat docks were planned to be constructed using timber piles for support of the dock deck. The depth to rock is 8 to 10 feet below the surface at each of these locations. In our opinion, timber piles can not be installed to provide a stable foundation for the dock deck, due to the shallow depth to the rock surface.

An alternative method using a floating dock section could be used. First an "anchor" section should be located near the edge of the water. This would be a relatively thick concrete pad (about 18 inches thick), with the perimeter thickened to about 24 inches. The pad should be at least 12 feet wide, and as long, along the shoreline, as the floating portion of the deck. Then, the floating deck section could be attached to the concrete pad. This method would also allow the floating section to be removed from the water during the freezing weather months, protecting them from destructive ice action. The concrete pad for the dock should be embedded into the soil so that the top of the pad is just above the existing ground surface. For the dock located at the west end of the pond, a "bench" should be excavated into the soil slope. The granular soil fill can be used to support the concrete pad. Additional "benches" could then be made down to the dock creating a stairway. For the dock located at the east end of the pond, the ground surface is flat, and the concrete pad can safely be supported on the site soils, found just below the ground surface.

PARKING LOT

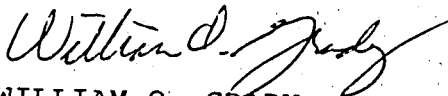
In the planned parking lot area there are several existing buildings which are to be demolished. The building debris should be removed from the site. Remaining basement foundations should be backfill with clean granular soil, nominally compacted in several lifts.

The existing soil fill will provide adequate support for the planned light vehicular traffic.

All of the recommendations contained in this report are based on the subsurface soil conditions revealed in the test borings. This office should be notified if the conditions encountered during construction vary significantly from those presented, so that additional recommendations can be made, if necessary.

Very truly yours,

ROBERT J. CARLIN & ASSOCIATES



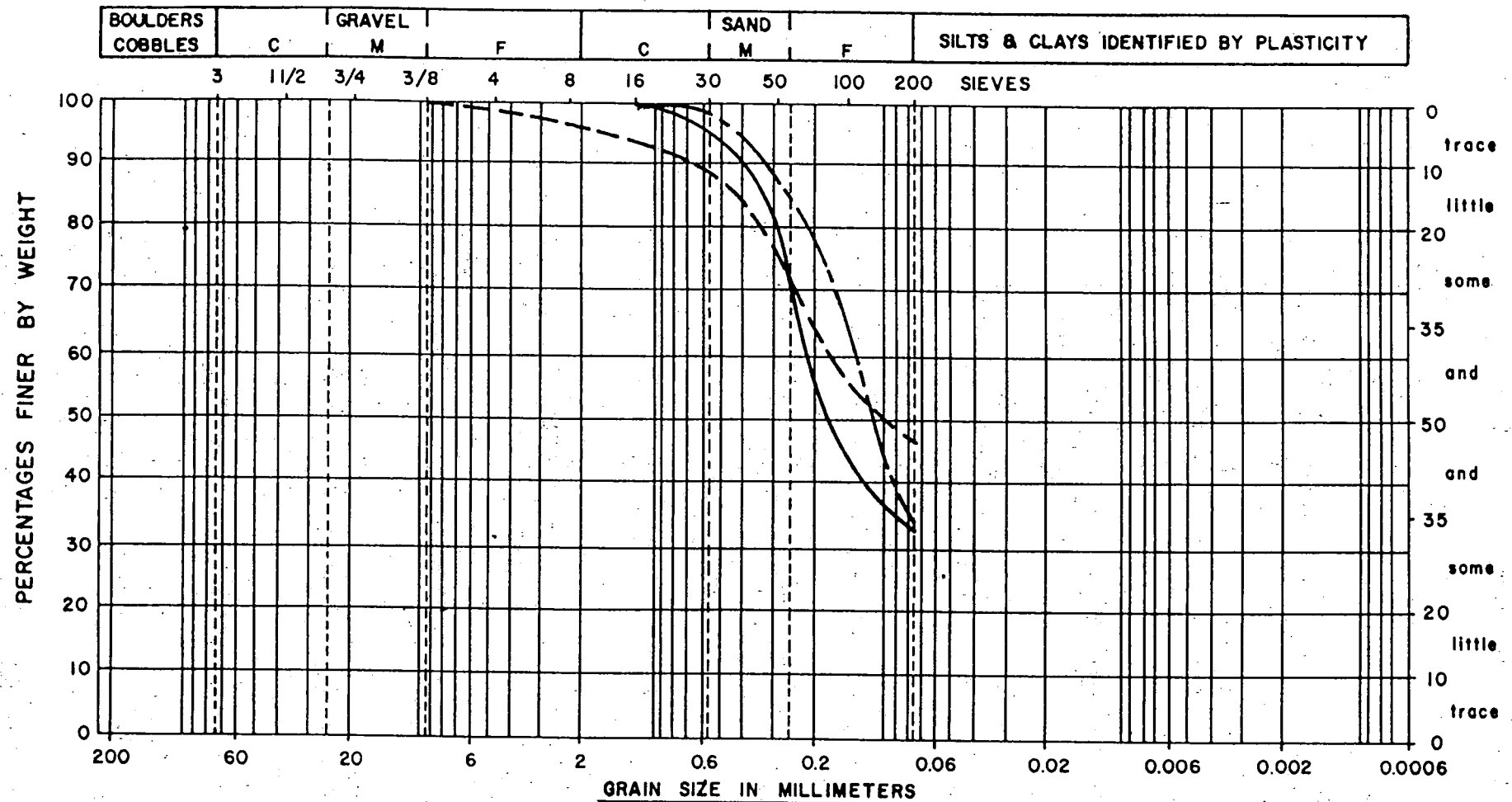
WILLIAM O. GRADY
Project Manager



ROBERT J. CARLIN, P.E.

RJC/WOG:rd
Enc.

SIEVE ANALYSIS



SYMBOL	BORING	SAMPLE	DEPTH	DESCRIPTION
————	B-3	S-2	2'0"-4'0"	Light brown coarse to fine SAND, some + Silt
-----	B-4	S-1	0'0"-2'0"	Dark brown coarse to fine SAND, and Silt, trace fine Gravel
- - - - -	B-5	S-2	3'0"-5'0"	Reddish brown coarse to fine SAND, some + Silt

PROJECT NEW MARKET POND

BY RBS

DATE 10 FEB 84

JOB No. 84-16

ERT J. CARLIN & Assoc.
LE FALLS, N.J.

TEST BORING LOG

BORING NO.: B-1

ECT NEW MARKET POND, PISCATAWAY, N.J.

SHEET NO.: 1 OF 1

NT T & M ASSOC.

JOB NO.: B4-16

NG CONTRACTOR ANALYTICAL SUBSURFACE INVESTIGATIONS, INC.

ELEVATION:

UND WATER

DATUM:

TE TIME DEPTH CASING

TYPE

CAS.

SAMP

CORE

TUBE

DATE START: 27 JAN 84

DATE FINISHED: 27 JAN 84

DRILLER: J. MEEHAN

INSPECTOR: WOG

DIA.

WT.

FALL

4"

2"

140 LB.

30"

CASING
BLOWS

SAMPLE
NO.

BLOWS
ON
SAMPLE
SPOON
PER 6"

SYMBOL

IDENTIFICATION

REMARKS

S-1

58*

100*

50*

20

16

20

S-2

13

13

8

14

S-3

11

8

Fill (Rd br cfS. a shale fgmts)

FILL (Red brown coarse to fine

Fill (Br cfS. 1+5, a cfG)

Sand, little Silt, some coarse to

Fill (Br cfS. 1+5, 1+cfG)
fine Gravel

END OF BORING @ 6'0"

* FROST TO 18"

					IDENTIFICATION	REMARKS
DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SYMBOL		
1		S-1L	W		<u>Brown Organic Silt</u>	
2			H			
3		S-2	1		Br D\$, occ smt fS	4'0"
4			1			
5		S-3	2		Br m fS, 1\$	
6			1			
7					<u>Brown medium to fine SAND,</u> little Silt	
8						
9		S-4	10		<u>do</u>	Fractured Shale
10			11			
11		S-5L	19		<u>Sand, some Silt, some coarse to</u>	Refusal
12			99			
13					<u>Rd br cfS, ss, scPG fine Gravel</u>	
14					END OF BORING @ 10'6"	
15						
16						
17						
18						
19						
20						
21						
22						
23						

ROBERT J. CARLIN & Assoc.
LITTLE FALLS, N.J.

TEST BORING LOG

BORING NO.: B-3

PROJECT NEW MARKET POND, PISCATAWAY, N.J.

SHEET NO.: 1 OF 1

CLIENT T & M ASSOC.

JOB NO.: B4-16

BORING CONTRACTOR ANALYTICAL SUBSURFACE INVESTIGATIONS, INC.

ELEVATION:

GROUND WATER

CAS. SAMP. CORE TUBE

DATUM:

DATE TIME DEPTH CASING TYPE

DATE START: 30 JAN 84

30 JAN 84 1530 4'0"

DIA. 2"

DATE FINISHED: 30 JAN 84

WT. 140 LB.

DRILLER: J. MEEHAN

FALL 30"

INSPECTOR: WOG

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SYMBOL	IDENTIFICATION	REMARKS
1		S-1	2		Br mfs, s+s	
2			2		Lt br cfs, s+s	Poss. Fill to 4'0"
3		S-2	10		Brown or light brown coarse to	
4			11		do fine SAND, some silt	Dry
5		S-3	16			
6			17		Rd br mfs, l+s	
7			25		Red brown medium to fine SAND,	wet
8			20		little (-) silt	
9			20			
10					END OF BORING @ 6'0"	
11						
12						
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22						
23						

ROBERT J. CARLIN & Assoc.
LITTLE FALLS, N.J.

TEST BORING LOG

BORING NO.: B-4

PROJECT NEW MARKET POND, PISCATAWAY, N.J.

SHEET NO.: 1 OF 1

CLIENT T & M ASSOC.

JOB NO.: B4-16

BORING CONTRACTOR ANALYTICAL SUBSURFACE INVESTIGATIONS, INC.

ELEVATION:

GROUND WATER

DATE	TIME	DEPTH	CASING	TYPE	CAS.	SAMP.	CORE	TUBE
						55		
				DIA.		2"		
				WT.		140 LB.		
				FALL		30"		

DATUM:

DATE START: 2 FEB 84

DATE FINISHED: 2 FEB 84

DRILLER: J. MEEHAN

INSPECTOR: WOG

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SYMBOL	IDENTIFICATION	REMARKS
1		S-1	7		Fill (Br cfs, a \$)	
2			8		FILL (Brown coarse to fine SAND, and Silt	
3		S-2	12			2'0"
4			14		Rd br cfs, a (-) \$, 1mf G	Dry
5		S-3L	20		Red brown coarse to fine Sand, and (-) Silt, little medium to fine Gravel	
6			24			
7			97			
8			100			
9					END OF BORING @ 5'0"	Refusal - Probable Shale
10						
11						
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ROBERT J. CARLIN & ASSOC.
LITTLE FALLS, N.J.

TEST BORING LOG

BORING NO. **D-5**

PROJECT **NEW MARKET POND, PISCATAWAY, N.J.**

SHEET NO. **1 OF 1**

CLIENT **T & M ASSOC.**

JOB NO. **B4-16**

BORING CONTRACTOR **ANALYTICAL SUBSURFACE INVESTIGATIONS, INC.**

ELEVATION:

GROUND WATER

CAS. SAMP. CORE TUBE

DATUM:

DATE TIME DEPTH CASING TYPE

SS

DATE START: **2 FEB 84**

DIA.

2"

DATE FINISHED: **2 FEB 84**

WT.

140 LB.

DRILLER: **J. MEEHAN**

FALL

30"

INSPECTOR: **WDB**

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SYMBOL	IDENTIFICATION	REMARKS
					WATER	6" ICE
1						
2		S-1	2		Bk 05 Black Organic Silt	
3			1			
4			7		Rd br \$, afS	
5		S-2	7			
6			8		Red brown SILT. and fine Sand	
7			16			
8			16		Rd br cfS, st\$	5'0"
9			4			
10		S-3	7		Rd cfS, l\$, s cfG	
11			14		Red brown coarse to fine Sand, little Silt, some coarse to fine Gravel	
12			56			Refusal - Shale
13					END OF BORING @ 7'0"	
14						
15						
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22						
23						

ROBERT J. CARLIN & Assoc. LITTLE FALLS, N.J.		TEST BORING LOG				BORING NO.: B-6	
PROJECT NEW MARKET POND, PISCATAWAY, N.J.						SHEET NO.: 1 OF 1	
CLIENT T & M ASSOC.						JOB NO.: B4-16	
BORING CONTRACTOR ANALYTICAL SUBSURFACE INVESTIGATIONS, INC.						ELEVATION:	
GROUND WATER				CAS.	SAMP.	CORE	TUBE
DATE	TIME	DEPTH	CASING	TYPE			DATUM:
3 FEB 84	1030	3'0"		DIA.	55		DATE START: 3 FEB 84
				WT.	2"		DATE FINISHED: 3 FEB 84
				FALL	140 LB.		DRILLER: J. MEEHAN
					30"		INSPECTOR: WOG

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SYMBOL	IDENTIFICATION	REMARKS
1		S-1	3		Bk cfS, s\$ <u>Black coarse to</u> 0'6"	
			3		<u>fine SAND, some Silt</u>	
2			6		Rd br cfS, s\$, 1cfG	
			5			
3		S-2	6		Rd br cfS, 1\$	Wet
			7			
4			12		do	
			17			
5		S-3	19			
			21		Rd br cfS, 1\$, sctG	
6			24			
			17		<u>Red brown coarse to fine SAND,</u>	
7		S-4	16		do <u>little Silt, some coarse to fine</u>	
			17		<u>Gravel</u>	
8			19			
9		S-5	23		do	
			30			
10			62			
			100/4"			Refusal - Shale
11					END OF BORING @ 10'4"	
12						
13						
14						
15						
16						
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19						
20						
21						
22						
23						

ROBERT J. CARLIN & Assoc. LITTLE FALLS, N.J.		TEST BORING LOG				BORING NO.: B-7	
PROJECT NEW MARKET POND, PISCATAWAY, N.J.						SHEET NO.: 1 OF 1	
CLIENT T & M ASSOC.						JOB NO.: B4-16	
BORING CONTRACTOR ANALYTICAL SUBSURFACE INVESTIGATIONS, INC.						ELEVATION:	
GROUND WATER				CAS.	SAMP.	CORE	TUBE
DATE	TIME	DEPTH	CASING	TYPE	SS		
				DIA.	2"		
				WT.	140 LB.		
				FALL	30"		
						DATUM:	
						DATE START: 3 FEB 84	
						DATE FINISHED: 3 FEB 84	
						DRILLER: J. MEEHAN	
						INSPECTOR: WOG	

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SYMBOL	IDENTIFICATION	REMARKS
1		S-1L			WATER	8" ICE
2			60*			* Wood in Tip (OLD R.R. TIE)
3			P			
4			P		BK 05	
5					<u>Black or gray Organic Silt</u>	
6			3		Gr 05	5'6"
7			9		Lt gr S & C, a f S, 15	6" Layers
8			11		<u>Light gray Silt & Clay; and fine</u>	
9			16		do <u>Sand, little Silt</u>	8'0"
10			16		Rd br cf S, 15, s (+) cf G	
11			42*		<u>Red brown coarse to fine SAND,</u>	* Blows on open end rod
12			63*		<u>little Silt, some (+) coarse to fine</u>	
13			98*		<u>Gravel</u>	
14			49*			50'0" @ 11'6"
15			53*			
16					END OF BORING @ 11'6"	
17						
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20						
21						
22						
23						

ROBERT J. CARLIN & Assoc. LITTLE FALLS, N.J.				TEST BORING LOG				BORING NO.: B-8			
PROJECT NEW MARKET POND, PISCATAWAY, N.J.								SHEET NO.: 1 OF 1			
CLIENT T & M ASSOC.								JOB NO.: B4-16			
BORING CONTRACTOR ANALYTICAL SUBSURFACE INVESTIGATIONS, INC.								ELEVATION:			
GROUND WATER				CAS.	SAMP.	CORE	TUBE	DATUM:			
DATE	TIME	DEPTH	CASING	TYPE				DATE START: 6 FEB 84			
6 FEB 84	1000	1'0"		DIA.		55		DATE FINISHED: 6 FEB 84			
				WT.		2"		DRILLER: J. MEEHAN			
				FALL		140 LB.		INSPECTOR: WOG			
						30"					

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SYMBOL	IDENTIFICATION	REMARKS
1		S-1L	9			Frost to 16"
2			9			Wood in Tip
3		S-2L	3			
4			4			
5		S-3	3			
6			1			
7		S-4	2			
8			3			
9			3			
10			11			
11			15			
12			24			
13			50			
14			60/3"			
15						
16						
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22						
23						

Red brown coarse to fine Sand,
 and Silt, little medium to fine
 Gravel
 Rd br cfs. a \$, 1m f G
 do
 Rd br Shale

END OF BORING @ 8'3"

Refusal